## PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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# PCT

## WRITTEN OPINION OF THE
## INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

| Date of mailing (*day/month/year*) | **26 MAY 2005** |
|---|---|

| Applicant's or agent's file reference | FOR FURTHER ACTION |
|---|---|
| 9432-246/POA | See paragraph 2 below |

| International application No. | International filing date (*day/month/year*) | Priority date (*day/month/year*) |
|---|---|---|
| PCT/US04/25490 | 06 August 2004 (06.08.2004) | 07 August 2003 (07.08.2003) |

International Patent Classification (IPC) or both national classification and IPC

IPC(7): G06K 9/34, 9/20 and US Cl.: 382/173, 282

Applicant

MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD.

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1. This opinion contains indications relating to the following items:

☒ Box No. I     Basis of the opinion

☐ Box No. II     Priority

☐ Box No. III     Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

☐ Box No. IV     Lack of unity of invention

☒ Box No. V     Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

☐ Box No. VI     Certain documents cited

☒ Box No. VII     Certain defects in the international application

☒ Box No. VIII     Certain observations on the international application

## 2. FURTHER ACTION.

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis(b)* that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

| Name and mailing address of the ISA/ US | Authorized officer |
|---|---|
| Mail Stop PCT, Attn: ISA/US<br>Commissioner for Patents<br>P.O. Box 1450<br>Alexandria, Virginia 22313-1450<br>Facsimile No. (703) 305-3230 | Aaron W Carter<br><br>Telephone No. (703)305-4700 |

Form PCT/ISA/237 (cover sheet) (January 2004)

**Box No. I  Basis of this opinion**

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐  This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a.   type of material

   ☐  a sequence listing

   ☐  table(s) related to the sequence listing

   b.   format of material

   ☐  in written format

   ☐  in computer readable form

   c.   time of filing/furnishing

   ☐  contained  in international application as filed.

   ☐  filed together  with the international application in computer readable form.

   ☐  furnished subsequently to this Authority for the purposes of search.

3. ☐   In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

**Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)
Claims  Please See Continuation Sheet _____ YES
Claims  Please See Continuation Sheet _____ NO

Inventive step (IS)
Claims  Please See Continuation Sheet _____ YES
Claims  Please See Continuation Sheet _____ NO

Industrial applicability (IA)
Claims  Please See Continuation Sheet                        YES
Claims  Please See Continuation Sheet _____ NO

2. Citations and explanations:

Please See Continuation Sheet

**Box No. VII  Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

The description is objected to as containing the following  defect(s) under PCT Rule 66.2(a)(iii) in the form or contents thereof:

On page 4, line 11, the name "Canagarajar" is misspelled and should be spelled "Canagarajah".

Claims 33 and 39 are objected to under PCT Rule 66.2(a)(iii) as containing the following defect(s) in the form or contents thereof:

The claims 33 and 39 do not exist do to incorrect numbering.

**Box No. VIII    Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the questions whether the claims are fully supported by the description, are made:

Claims 41 and 42 objected to under PCT Rule 66.2(a)(v) as lacking clarity under PCT Article 6 because claims 33, 39, 41 and 42 are indefinite for the following reason(s):

  Claims 41 and 42 are indefinite because there are two of each claim.

  Claim 41 is indefinite because the phrase "texture" lacks antecedent basis.

**Supplemental Box**
In case the space in any of the preceding boxes is not sufficient.

**V.1. Reasoned Statements:**
The opinion as to Novelty was positive (Yes)with respect to claims 3-8,10,12,14,17-20,24-29,36,37,41,43,47-48
The opinion as to Novelty was negative (No) with respect to claims 1,2,9,11,13,15,16,21-23,30-32,34,35,38,40,42,44-46,49
The opinion as to Inventive Step was positive (Yes)with respect to claims 3-8,12,18-20,24-29,48
The opinion as to Inventive Step was negative(NO) with respect to claims 1,2,9-11,13-17,21-23,30-32,34-38,40-47,49
The opinion as to Industrial Applicability was positive (YES) with respect to claims 1-32,34-38,40-49
The opinion as to Industrial Applicability was negative(NO) with respect to claims NONE

**V. 2. Citations and Explanations:**
Claims 1, 2, 9, 11, 13, 15, 16, 21-23, 30-32, 34, 35, 38, 40, 42, 44-46 and 49 lack novelty under PCT Article 33(2) as being anticipated by US Patent Application Publication 2002/0191861 to Cheatle.

As to claim 1, Cheatle discloses an automatic image cropping system for use with a portable device having an image capture mechanism and a limited resource for storing or transmitting captured information (paragraph 0080 and 0081, wherein the camera corresponds to a portable device), the system comprising a region of interest suggestion engine defining plural image region candidates by performing image segmentation on an image stored in digital form, determining if an image region candidate is likely to be more or less interesting to a user than another image region candidate (paragraph 0102 and 0103), and selecting an image region candidate determined as likely to be of most interest to the user (paragraph 0154 and 0155).

As to claim 2, Cheatle discloses the system of claim 1, wherein said region of interest suggestion engine measures entropies of the image region candidates and uses entropy thus measured as a measure of likelihood of user interest (paragraph 0154 and 0155, wherein penalty score corresponds to entropies).

As to claim 9, Cheatle discloses the system of claim 1, wherein said region of interest suggestion engine segments the image based on image texture and color consistency (paragraph 0128).

As to claim 11, Cheatle discloses the system of claim 1, wherein said region of interest suggestion engine employs a fuzzy k-mean clustering method to perform the image segmentation (paragraph 0095).

As to claim 13, Cheatle discloses the system of claim 1, wherein said region of interest suggestion engine performs color transformation on an image stored in digital form (paragraph 0086).

As to claim 15, Cheatle discloses the system of claim 1, wherein said region of interest suggestion engine measures sizes of image region candidates relative to a common viewing area of the image and uses relative size thus measured as a measure of likelihood of user interest (paragraph 0116).

As to claim 16, Cheatle discloses the system of claim 1, wherein said region of interest suggestion engine measures locations of image region candidates relative to a common viewing area of the image and uses relative location thus measured as a measure of likelihood of user interest (paragraph 0120 and 0127, lines 8-11).

As to claim 21, Cheatle discloses the system of claim 1, wherein said engine uses camera sensor data to determine likelihood of user interest (paragraph 0127).

As to claim 22, please refer to the statement made for claim 1 above.

**Supplemental Box**
In case the space in any of the preceding boxes is not sufficient.

As to claim 23, please refer to the statement made for claim 2 above.

As to claim 30, Cheatle discloses the method of claim 22, further comprising suggesting the confirmation of the selected image region candidate to a user (paragraph 0155 and 0158).

As to claim 31, Cheatle discloses the method of claim 30, further comprising receiving a user confirmation of the selected image region candidate (paragraph 0156).

As to claim 32, Cheatle discloses the method of claim 31, further comprising processing the image based on the user confirmation (paragraph 0156).

As to claim 34, Cheatle discloses the method of claim 31, further comprising segregating the selected image region candidate from at least one other part of the image in response to receipt of the user confirmation (paragraph 0156).

As to claim 35, Cheatle discloses the method of claim 31, further comprising saving the selected image region candidate absent image contents external to the selected image region in response to receipt of the user confirmation (paragraph 0156, wherein it is inherent that the region selected by the user is saved).

As to claim 38, Cheatle discloses the method of claim 30, further comprising:
**Receiving a user contradiction of the selected image region candidate; and**
Selecting a new image region candidate determined as most likely to be of most interest to the user based on the user contradiction (paragraph 0156).

As to claim 40, Cheatle discloses the method of claim 22, further comprising segmenting the image based on image texture and color consistency (paragraph 0128).

As to claim 42, please refer to the statement made for claim 11 above.
As to claim 42, please refer to the statement made for claim 13 above.
As to claim 44, please refer to the statement made for claim 15 above.
As to claim 45, please refer to the statement made for claim 16 above.

As to claim 46, Cheatle discloses the method of claim 22, further comprising capturing an image in digital form (paragraph 0086).

As to claim 49, please refer to the statement made for claim 21 above.

Claims 10 and 41 lack an inventive step under PCT Article 33(3) as being obvious over Cheatle in view of an article entitled "A Robust Automatic Clustering Scheme for Image Segmentation Using Wavelets" by Porter et al. ("Porter").

As to claims 10 and 41, Cheatle discloses the system of claim 9.
Cheatle does not disclose expressly wherein said region of interest suggestion engine uses vectors calculated from Wavelet transform to represent texture information.
Porter discloses a region of interest suggestion engine that uses vectors calculated from Wavelet transform to represent texture information (Porter, Abstract).
Cheatle & Porter are combinable because they are from the same art of image processing and more specifically image segmentation.
At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the Wavelet transform to represent texture information, as taught by Porter, in the automatic image cropping system disclosed by Cheatle.
The suggestion/motivation for doing so would have been that using the Wavelet transform provides a more robust image segmentation (Porter, Abstract).
Therefore, it would have been obvious to combine Cheatle with Porter to obtain the invention as specified in claims 10 and 41.

Claims 14 and 43 lack an inventive step under PCT Article 33(3) as being obvious over Cheatle in view of USPN 5,341,226 to Shiau.

As to claim 14 and 43, Cheatle discloses the system of claim 13.
Cheatle does not disclose expressly wherein said region of interest suggestion engine transforms an image in RGB format into HUV (Hue, Saturation, and Intensity) format.
Shiau discloses transforming an image in RGB format into HUV (Hue, Saturation, and Intensity) format (column 5, line 64 - column 6, line 23 wherein HSI corresponds to HUV).

**Supplemental Box.**
**In case the space in any of the preceding boxes is not sufficient.**

Cheatle & Shiau are combinable because they are from the same art of image processing.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to transform the image region from RGB to HUV as taught by Shiau in the automatic cropping system disclosed by Cheatle.

The suggestion/motivation for doing so would have been to represent intensity as one signal (Shiau, column 5, line 68 - column 6, line 2).

Therefore, it would have been obvious to combine Cheatle with Shiau to obtain the invention as specified in claims 13 and 43.

Claims 17 and 47 lack an inventive step under PCT Article 33(3) as being obvious over Cheatle in view of US Patent Publication 2003/0035580 to Wang et al. ("Wang").

As to claims 17 and 47, Cheatle discloses the system of claim 1.

Cheatle does not disclose expressly wherein the region of interest suggestion engine pre-processes the image to eliminate noise in blurred text histograms to smooth the image.

Wang discloses image segmentation comprising of pre-processes the image to eliminate noise in blurred text histograms to smooth the image (paragraph 0040 and 0041).

Cheatle & Wang are combinable because they are from the same art of image processing.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the pre-processing technique of the image to eliminate noise as taught by Wang in the automatic cropping system disclosed by Cheatle.

The suggestion/motivation for doing so would have been to reduce the salt and pepper noise in a scene image (Wang, paragraph 0041).

Therefore, it would have been obvious to combine Cheatle with Wang to obtain the invention as specified in claims 17 and 47.

Claim 36 lacks an inventive step under PCT Article 33(3) as being obvious over Cheatle in view of US Patent Application Publication 2003/0122942 to Parker et al. ("Parker").

As to claim 36, Cheatle discloses the method of claim 31.

Cheatle does not disclose expressly further comprising transmitting the selected image region candidate absent image contents external to the selected image region in response to receipt of the user confirmation.

Parker discloses transmitting the selected image region candidate absent image contents external to the selected image region (paragraph 0027).

Cheatle & Parker are combinable because they are from the same art of image processing.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to transmit the region selected by the user using the network connection disclosed by Parker.

The suggestion/motivation for doing so would have been to transmit a cropped image.

Therefore, it would have been obvious to combine Cheatle with Parker to obtain the invention as specified in claim 36.

Claim 37 lacks an inventive step under PCT Article 33(3) as being obvious over Cheatle in view of US Patent Application Publication 2002/0114535 to Luo.

As to claim 37, Cheatle discloses the method of claim 31.

Cheatle does not disclose expressly zooming in on the image region candidate in response to receipt of the user confirmation.

Luo discloses zooming in on the image region candidate (paragraph 0022).

Cheatle & Luo are combinable because they are from the same art of image processing.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to zoom in on the image region candidate, as taught by Luo, in response to user confirmation as disclosed by Cheatle.

The suggestion/motivation for doing so would have been to improve the quality of finished photographs and picture sharing experiences (Luo, paragraph 0002).

Therefore, it would have been obvious to combine Cheatle with Luo to obtain the invention as specified in claim 37.

Claims 3-8, 12, 18-20, 24-29 and 48 meet the criteria set out in PCT Article 33(2)-(3), because the prior art does not teach or fairly suggest the exact equation set forth for the region of interest suggestion engine.

Claims 1-32, 34-38 and 40-49 meet the criteria set out in PCT Article 33(4), and thus meet industrial applicability because the subject matter claimed can be made or used in industry.